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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* GEORGE EARL PETERSON

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Appeal 2009-000963  
Application 09/915,963  
Technology Center 2800

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Decided:<sup>1</sup> June 22, 2009

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Before ALLEN R. MACDONALD, *Vice Chief Administrative Patent Judge*,  
JAMES D. THOMAS, and MAHSHID D. SAADAT, *Administrative Patent  
Judges*.

Thomas, *Administrative Patent Judge*.

DECISION ON APPEAL

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 CFR § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Data (electronic delivery).

### STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 1, 5 through 11, 15 through 21, and 23 through 25.

Appellant has cancelled claims 2 and 12, and the Examiner has objected to claims 3, 4, 13, 14, and 22. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

### INVENTION

Appellant's antenna structure comprises a tapered antenna element coupled with a symmetrically shaped ground plane. The antenna element comprises a traveling wave antenna supporting a phase velocity greater than the speed of light. (Spec, p. 2, Summary and figures 2(a) and 4(a).)

### REPRESENTATIVE CLAIM

1. An antenna structure comprising:

at least one antenna element, the at least one antenna element having at least one taper; and

a symmetrical finite ground plane coupled with the at least one antenna element;

wherein the at least one antenna element comprises a traveling wave antenna supporting a phase velocity greater than the speed of light.

### PRIOR ART AND EXAMINER'S REJECTION

The Examiner relies on the following references as evidence of unpatentability:

Ogot	US 5,648,787	Jul. 15, 1997
Wicks	US H2016 H	Apr. 2, 2002
		(Filing date Mar. 15, 1986)

John D. Kraus "Antennas" Second Edition, McGraw Hill, Inc., New York (1988), pp. 231, 291-293, and 759-760.

All claims on appeal, claims 1, 5 through 11, 15 through 21, and 23 through 25, stand rejected under 35 U.S.C. § 103. As evidence of obviousness, the Examiner relies upon Wicks in view of Ogot, further in view of Kraus.

### CLAIM GROUPINGS

Based upon Appellant's arguments in the principal Brief, we consider independent claim 1 as representative of the subject matter of independent claims 1, 11, and 21. Other than dependent claim 20, no arguments are presented before us as to any other dependent claim on appeal.

### PROSECUTION HISTORY

This application was subject to a prior appeal, appeal number 2005-2760, mailed on October 27, 2005. The panel of this Board at that time reversed the outstanding rejection under 35 U.S.C. § 112, first paragraph, and also reversed the rejection of certain claims under 35 U.S.C. § 102(e). On the other hand, a separate rejection of certain claims under 35 U.S.C. § 103 was sustained. That panel introduced a new ground of rejection against then pending independent claims 1 and 11 on appeal under 35 U.S.C. § 103 in accordance with 37 C.F.R. § 41.50(b). The Examiner was said to

be free to introduce separate rejections of the remaining claims on appeal. As indicated earlier in this opinion, Appellant cancelled dependent claims 2 and 12 in subsequent prosecution and introduced the common subject matter of these claims into independent claims 1, 11, and 21 presently before us.

## ISSUES

1. Has Appellant shown that the Examiner erred in finding that the combination of teachings of Wicks in view of Ogot, further in view of Kraus, would have rendered obvious the subject matter of representative independent claim 1 on appeal including the feature of “wherein the at least one antenna element comprises a traveling wave antenna supporting a phase velocity greater than the speed of light?”

2. Has Appellant shown that the Examiner erred in finding that this combination of references teaches the feature of dependent claim 20 on appeal which adds “a slow wave antenna to widen the directivity of the antenna structure?”

## FINDINGS OF FACT

1. In conjunction with figures 1 and 4 of Wicks, we reproduce the substance of his abstract here:

A Mono-Blade Antenna is disclosed which operates over many octaves of bandwidth. Electromagnetic waveforms may be transmitted and received with multi-decade bandwidth using: a metal ground plane, a Mono-Blade Antenna element fixed above the ground plane, and a coaxial transmission line feed which is connected to the antenna element and the ground plane. The antenna element has three sections: a throat, a mouth, and a radial tip. The throat is comparatively narrow and serves as the element feed point by being

connected to the center conductor of the coaxial cable. The mount is the mid-section of the antenna element, which is the widest section of the blade. The tip of the blade is formed by an arc of approximately constant radius, which results in a low voltage standing wave ratio.

The advantages of the antenna structure of Wicks are set forth at column 2, line 40 through 49:

The present invention has several important properties: (1) the antenna has a large bandwidth, (2) the antennas has little or no time (phase) dispersion, (3) the input VSWR (voltage standing wave ratio) is extremely good (i.e., less than 1.2 to 1), (4) the antenna is relatively inexpensive to manufacture as compared to other types of broadband antennas, (5) the antenna can be employed in a phased array providing a large bandwidth, high gain and good directivity, (6) the antenna is a nonresonant structure unlike most other antennas, which contributes to its broadband nature.

In comparison to the Mono-Blade Antenna of figure 1, figures 2(a) and 2(b) are described in this manner at column 2, lines 50 through 67:

FIG. 1 is an illustration of the Mono-Blade Antenna of the present invention. This antenna contains a blade A-H (with geometry described below) which is fixed over a metal ground plane and fed by a coaxial transmission line which is secured to the ground plane.

To understand the theory of operation of the antenna of FIG. 1, it is necessary to consider its dual antenna, which is constructed by employing Image Theory on the antenna of FIG. 1.

To construct the dual antenna, the mirror image of the metal blade element is constructed below the ground plane, and then the ground plane (image plane) is removed (see FIG. 2a). The resulting antenna (see FIG. 2b) has electrical properties similar to the Mono-Blade Antenna. Consider the dual antenna in FIG. 2b to be a transmission line slot in a metal ground plane. The slot transmission line has a TEM mode of propagation.

Figure 4 is briefly described in this manner at column 3, lines 45 through 50:

The manner in which the Mono-Blade Antenna is fed with a coaxial transmission line is described with the aid of FIG. 4. Here the outer conductor of the coaxial transmission line is secured (possibly soldered) to the ground plane. The center conductor of the coaxial transmission line is attached to the blade at point H.

Wicks states at column 4, lines 9 and 10 that “[p]ractically speaking, the Mono-Blade Antenna is superior to its dual antenna.” Additionally, for an exemplary Mono-Blade Antenna of certain dimensions that are described beginning at line 18 of column 4, the Vertical Beamwidth is 19 degrees and the Horizontal Beamwidth is 50 degrees.

2. Consistent with Ogot’s showings in figure 3A, figure 6, and figure 8A, his antenna structure utilizes a symmetrical finite ground plane illustrated in these figures. With respect to the showing in figure 3A, column 4, line 66 through column 5, line 3 states:

The shape of the ground plane is also not absolutely critical. A flat and circular disk shape maximizes the surface area of the ground plane perpendicular to the transmission element, and provides a uniform transmission pattern.

3. As to Kraus, though not relied upon by the Examiner regarding the rejection before us, this handbook does indicate at page 231 that in the equation  $v=pc$  or  $p=v/c$ , the ratio  $p$  is called the relative phase velocity which is the velocity  $v$  along a conductor relative to the velocity of light  $c$ .

As relied upon by the Examiner, the showing at page 759 of Kraus indicates in figure 16-41 a surface wave antenna that is characterized at the bottom of page 759 as a traveling-wave antenna with an energy flowing

above the guiding surface having a velocity  $v < c$  (slow wave). The Examiner also relies upon the showing in figure 16-42 at the top of page 760 of Kraus which shows an end view and a side view of an open-top waveguide antenna with continuous energy leakage. This type of antenna is characterized in Kraus as a leaky-wave antenna that is also considered a traveling-wave antenna where most of the energy flows within the antenna structure. This structure is also characterized as a fast wave ( $v > c$ ).

## PRINCIPALS OF LAW OBVIOUSNESS

Appellant has the burden on appeal to the Board to demonstrate error in the Examiner's position. See *In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007).



The Supreme Court reaffirmed principles based on its precedent that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 416. The operative question in this “functional approach” is thus “whether the improvement is more than the predictable use of prior art elements according to their established functions.” *Id.* at 417. The Court noted that “[c]ommon sense teaches . . . that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* at 420.

The Federal Circuit recently concluded that it would have been obvious to combine (1) a device for actuating a phonograph to play back sounds associated with a letter in a word on a puzzle piece with (2) a processor-driven device capable of playing the sound associated with a first letter of a word in a book. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007). In reaching that conclusion, the Federal Circuit recognized that “[a]n obviousness determination is not the result of a rigid formula disassociated from the consideration of the facts of a case. Indeed, the common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not.” *Id.* at 1161 (citing *KSR*, 550 U.S. at 416). The Federal Circuit relied in part on the fact that Leapfrog had presented no evidence that the inclusion of a reader in the combined device was “uniquely challenging or difficult for one of ordinary skill in the art” or “represented an unobvious step over the prior art.” *Id.* (citing *KSR*, 550 U.S. at 418).

In the absence of separate arguments with respect to claims subject to the same rejection, those claims stand or fall with the claim for which an argument was made. *See In re Young*, 927 F.2d 588, 590 (Fed. Cir. 1991). *See also* 37 C.F.R. § 41.37(c)(1)(vii)(2004).

Dovetailing with this precedent, we note further that the test for obviousness has been further characterized as not whether the features of a secondary reference may be bodily incorporated into the structure of a primary reference. It is also not that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. *In re Keller*, 642 F.2d 414, 425 (CCPA 1981); *In re Young*, 927 F.2d at 591.

The prior art relied on to prove obviousness must be analogous art. As explained in *Kahn*,

the ‘analogous-art’ test . . . has long been part of the primary Graham analysis articulated by the Supreme Court. *See Dann* [v. *Johnston*,] 425 U.S. [219,] 227-29 (1976), *Graham* [v. *John Deere Co.*], 383 U.S. [1], 35. The analogous-art test requires that the Board show that a reference is either in the field of the applicant’s endeavor or is reasonably pertinent to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection. *In re Oetiker*, 977 F.2d 1443, 1447 (Fed.Cir.1992). References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art. *Id.* (“[I]t is necessary to consider ‘the reality of the circumstances,’- in other words, common sense-in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the invention.” (quoting *In re Wood*, 599 F.2d 1032 (C.C.P.A. 1979)).

*Kahn*, 441 F.3d at 986-87. *See also In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992) (“[a] reference is reasonably pertinent if, even though it may be in a different field from that of the inventor’s endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor’s attention in considering his problem.”).

#### ANALYSIS

Page 6 of Appellant’s principal Brief on Appeal does not contest the combinability of Wicks and Ogot together within 35 U.S.C. § 103. Indeed, our prior decision found proper the combination of Wicks and Ogot within 35 U.S.C. § 103 as well as that Wicks did not teach away as argued in the prior decision and again in the paragraph bridging pages 6 and 7 of the principal Brief on appeal before us. As expressed at pages 6 and 7 of the principal Brief, Appellant takes the position that the Examiner fails to explain why one of ordinary skill in the art would have been motivated to modify this Wicks and Ogot combination with the teachings in Kraus.

We would tend to agree with Appellant’s basic view in the principal Brief as well as the Reply Brief that Kraus is silent with respect to issue of widening directivity since the Examiner only relies upon pages 759 and 760 of Kraus’s antenna design handbook. From our perspective, however, this is not dispositive of the issues before. The teaching value of Kraus does indicate the existence in the antenna arts of so-called fast wave antennas and slow wave antennas that indirectly respectively indicate a phase velocity greater than and less than the speed of light as noted in finding of fact 3.

At least with respect to the subject matter of representative independent claim 1 on appeal, the directivity of the antenna structure as a whole is not characterized in any manner, in contrast to the subject matter of dependent claim 20 on appeal. The subject matter of dependent claim 20 appears to be only derived from the paragraph at the middle of page 11 of the Specification as filed. As a part of the figure 4(a) embodiment, a so-called slow wave antenna element 220 is said to be incorporated into the structure of that figure to ensure greater coverage and relatively wider directivity of the antenna flag elements 210 and 215. The functionality of this recitation in dependent claim first appears to be contrary to that which Appellant has indicated in the background of the invention at Specification pages 1 and 2 that tapered slot antennas including the traveling wave antenna associated with prior art figure 1 and discussed at Specification pages 3 through 7 have been characterized as having relatively narrow directivity and a narrow directional beam pattern.

The Examiner's responsive arguments beginning at bottom of page 6 of the Answer tends to rely more upon the teachings of Wicks for the feature of dependent claim 20 on appeal. To the extent that Appellant is correctly characterizing Wicks as a slow wave-type of antenna structure, our finding of fact 1 does indicate it teaches a relatively wide directivity as noted in the advantages set forth in this finding of fact at column 2, lines 40 through 49, and in the discussion of the vertical and horizontal beamwidth at column 4. Once the issue of the obviousness of the subject matter of representative independent claim 1 on appeal has been firmly established, the artisan would have well-appreciated that the subject matter of dependent claim 20 would

have been obvious as well. The artisan would have well-appreciated that for a given use, overall antenna designs may include both capabilities of slow wave and fast wave antenna structural elements within them as Kraus indicates clearly was known in the art.

Kraus well supports the fact that a phase velocity may exist greater than the speed of light. Kraus also supports that this may be a property of so-called traveling wave antennas as well. We are struck by the fact that the architecture of Appellant's initial embodiment in figure 2(a) is consistent with the showings in Wicks in his figures 1 and 4. The verbal description of this antenna structure as a whole in Wicks that we reproduced in finding of fact 1 is consistent with the tapering approach emphasized in the so-called antenna flag "element" of Appellant's disclosed invention in figure 2(a). Therefore, the artisan would have appreciated, in our view, that Wicks would also be fairly characterized in the art as "supporting a phase velocity greater than the speed of light" to the same extent as claimed and disclosed in Appellant's own invention. The corresponding structures would have led to the same conclusion in our view from an artisan's perspective. It is Appellant's characterization of the so-called TEM propagation that is used to characterize Wicks' entire antenna disclosure as a slow wave antenna. As we reproduced in findings of fact 2 with respect to the discussion at column 2, lines 50 through 67, Image Theory of antennas is utilized to characterize a mirror image element and image plane in Wicks' figures 2(a) which has been removed in figure 2b. This is characterized as a dual antenna such as to be a transmission line slot in a metal ground plane.

On the other hand, the discussion in finding of fact 1 that is noted at column 4, lines 9 and 10, speaks of the Mono-Blade Antenna of figures 1 and 4 as having superior qualities to the dual antenna, which is only discussed with respect to figure 2. In these respect than, the artisan may well understand that the actual teaching value in Wick is of a Mono-Blade Antenna that behaves in a similar manner as to Appellant's disclosed and claimed invention because of the corresponding elevated and tapered antenna element. Because of this relative identity of structure, a person of ordinary skill in the art correspondingly would have expected the antenna element of Wicks shown in figures 1 and 4 to behave in a corresponding manner, such that it would broadly "support" a phase velocity greater than the speed of light. Appellant predicates patentability of representative claim 1 on appeal on the wherein clause of this claim. As repeatedly noted by the Examiner in his own way, there is no positively claimed (and no disclosed) basis that the antenna element actually operates at a phase velocity greater than the speed of light.

#### CONCLUSION AND DECISION

Appellant has not shown that the Examiner erred in concluding that the combination of Wicks in view of Ogot, further in view of Kraus, reasonably would have taught or suggested to a person of ordinary skill in the art an antenna element comprising a traveling wave antenna supporting a phase velocity greater than the speed of light in representative independent claim 1 on appeal. Correspondingly, we reach a similar conclusion with respect to the subject matter of dependent claim 20 on appeal since

Appellant has not shown that the Examiner erred in concluding the obviousness of the subject matter of this claim by adding a slow wave antenna to widen the directivity of the antenna structure.

The decision of the Examiner rejecting claims 1, 5 through 11, 15 through 21, and 23 through 25 under 35 U.S.C. § 103 is affirmed. All claims on appeal are unpatentable.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. §1.136(a). See 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

pgc

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